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ABSTRACT

During the past decade interest in developing thinking skills has continued to be high and particular attention has been given to basic inquiry of the cognitive processes that are used in investigating topics and problems in the social studies. The central purpose of this study is to identify a set of processes that may be used to plan instruction in the social studies. A review of processes that should be emphasized in instructional planning includes a summary of processes in selected professional publications that deal with inquiry, thinking, and cognitive activities and a summary of processes in social studies textbooks and accompanying teacher's manuals. A cohesive set of processes is identified and teaching strategies and related techniques for each of the processes proposed for instructional planning are described. The investigator makes a critical assessment of strengths and weaknesses of the proposed set of processes. Ways in which the processes may be used to improve instructional planning and to analyze materials are also considered. (Author/SHM)

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INQUIRY PROCESSES
IN THE SOCIAL SCIENCES

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I

INTRODUCTION

The development of thinking skills has been a basic goal of the social studies program for many years. Publication of a yearbook on critical thinking by the National Council for the Social Studies highlighted the interest that had developed during the 1930's (Anderson, 1942). During the next two decades critical thinking was emphasized along with the development of problem solving and reflective thinking (Michaelis, 1950; Carpenter, 1953, Boyles, 1956; Metcalf, 1963). Underlying the interest in thinking skills was the analysis of How We Think published by Dewey in 1910 and 1933 (Russell, 1956; Hullfish and Smith, 1961).

During the past decade interest in developing thinking skills has continued to be high and particular attention has been given to basic inquiry of the cognitive processes that are used in investigating topics and problems in the social studies. Attempts have been made to identify specific processes that are essential to effective problem solving, critical thinking, and creative thinking. (Michaelis, 1968). There has been a move beyond the setting forth of steps to take to solve a problem or evaluated a given situation to various processes that may be used as different steps are taken (Michaelis, 1973).

The focus on identifying specific processes has led to a variety of proposals. (Burton, et al., 1969; Raths, et al., 1967; Michaelis, 1972; Fraenkel, 1973). Studies have been carried out to test the usefulness of strategies for developing cognitive processes (Taba, 1966). Teacher's manuals that accompany social studies textbooks have included lists of processes and provided learning experiences to promote their development by students (Field Educational Publications, Inc., Harcourt Brace and Jovanovich, and Silver-Burdett). Yet not a single study has been done to identify those processes that are currently being emphasized in social studies materials for students and teachers. Nor has a synthesis been made of the teaching strategies that may be used to develop processes in social studies instruction.

Purposes of This Study

The central purpose of this study is to identify a set of processes that may be used to plan instruction in the social studies. The need for a cohesive set of processes under which various skills could be subsumed was brought home to the investigator during two recent curriculum development experiences. The first was the Asian Studies Curriculum Project (1968) in which units of instruction were prepared for use in elementary and secondary schools. The variety of processes and lack of consistency among and within proposed sets of processes led to confusion and serious difficulties in using processes in instructional planning. The second experience was as chairman of a statewide social science curriculum committee (1968). The committee proposed a set of processes that would be useful in social studies instructional planning, but did not carry the task through to needed refinement.

A second purpose of this study is to identify the processes that are being stressed in recently published professional books for teachers and in social studies textbooks. This purpose is viewed as being essential to the attainment of the purpose noted above. A cohesive set of processes in which each process is defined and related skills are identified will be proposed. In addition, it should prove to be useful to instructional planners to know the processes that are being emphasized in materials that go into the hands of teachers and students.

A third purpose of this study is to identify teaching strategies that have been proposed for the development of processes and to propose new ones as needed. Available teaching strategies need to be identified and adapted to fit a cohesive set of processes. New teaching strategies are needed for those processes in the set finally proposed that have not been given attention by instructional planners. Suggestions for teachers and related techniques to teach students are sorely needed in instructional planning at all levels.

Definition of Terms

The terminology used in this study is defined from the point of view of instructional planners. The current emphasis on inquiry into topics, issues, and problems in the social studies as opposed to expository instruction has been kept in mind in the definition of terms. Formal dictionary definitions and technical psychological definitions have been reviewed and used as a check against definitions used in this study, but the final definition of terms has been made in the current language of instructional planners to the best of the investigator's ability.

Many instructional planners use thinking skills, cognitive processes, and inquiry processes synonomously. A few use such terms as cognitive tasks and methods of intelligence to refer to the same skills or processes. In this study, inquiry processes are used to refer to those thinking or cognitive operations students are asked to perform as they use

instructional materials to investigate topics, problems and issues. Examples of inquiry processes are observing, interpreting, generalizing, and inferring. Precise definitions of each inquiry process are presented in III, A PROPOSED SET OF INQUIRY PROCESSES.

Procedures

The first step taken in this study was to review the proposals of others regarding processes that should be emphasized in instructional planning. Attention was given to the works of science educators as well as to those involved in social studies education. Special attention was given to the processes included in recently published professional materials and teacher's manuals that accompany social studies textbooks.

The second step was the creation of a cohesive set of processes based on an analysis of the processes identified in step one. An attempt was made to subsume certain processes under what seemed to the investigator to be core processes. For example, translating as a process was subsumed under interpretation and grouping was viewed as an instance of classifying. During this phase of the study precise definitions of each process were formulated

The third step was the design of teaching strategies and related techniques to include in instruction of students for each of the processes finally selected for inclusion in the set proposed for instructional planning. The strategies were critically reviewed by two experts on social studies instruction who made suggestions that have been incorporated by the investigator.*

The final step in this study may well be referred to as a critical assessment by the investigator of strengths and weaknesses of the proposed set of processes along with thoughts on needed studies. Ways in which the processes may be used to improve instructional planning and analyze materials were also considered.

*Grateful acknowledgment is made to Dr. Ruth Grossman and Dr. Cecilia Traugh.

II

A REVIEW OF PROCESSES IN SELECTED MATERIALS

The review of processes in selected materials is presented in two sections. The first includes a summary of processes in selected professional publications for teachers that deal with inquiry, thinking, and cognitive activities. The second includes a summary of processes in social studies textbooks and accompanying teacher's manuals.

Processes in Professional Publications

Several writers have used the Taxonomy of Educational Objectives (Bloom, et al., 1956) as a source of cognitive processes. A typical procedure has been to compose questions related to the six levels of cognition in the Taxonomy: knowledge, comprehension, application, analysis, synthesis, evaluation.

One of the most widely used reports based on the Taxonomy is the one prepared by Sanders (1966) who used seven categories of cognition instead of the six in the Taxonomy: memory, translation, interpretation, application, analysis, synthesis, evaluation. Several other writers have used the Taxonomy as a source of processes, relying on the six levels of cognition proposed by Bloom and his coworkers.

Several difficulties arise when sole reliance is placed on the Taxonomy. For example, a process such as classifying may be found in several different categories and has been completely overlooked by some individuals. The broad and widely inclusive category "Application" has within it such basic processes or operations as defining, hypothesizing, inferring, predicting, and others related to solving problems or applying ideas comprehended by the learner. The Taxonomy is helpful in making a decision as to the level of cognition that is desired when a given process is being built into instructional materials. For example, the process of classifying may be pitched at the knowledge level when the objective is to have students learn a classification, or it may be pitched at the synthesis level when the objective is to have students create a new classification.

Taba (1966) outlined three cognitive tasks and related teaching strategies for developing them in the social studies. The three tasks were designated as concept formation (classifying), inferring and generalizing which included interpretation of data, and applying generalizations (to make predictions).

The proposed teaching strategies are quite useful as models. For example, the steps suggested for developing concepts are useful in developing student's skills in classifying and may serve as a model for generating teaching strategies for other processes. Similarly, the steps suggested for the other two tasks are directly useful in developing generalizing and predicting, and may be used to generate models for other processes. Two improvements that may be made in using the strategies as models is to add sample questions and examples of applications that illustrate the use of the teaching strategies in different social studies situations.

The report of the Statewide Social Sciences Study Committee (1968) included the following processes: observing, classifying, defining, comparing/contrasting, generalizing (including interpreting, hypothesizing, and predicting), inferring, integrating, and communicating. Attention was also given to steps of procedure to use in policy mode studies: defining the problem, exploring values, gathering data, proposing solutions, and making decisions.

Communicating is a broad activity that involves skills that are essential to the study and sharing of all topics in the social studies. Integrating may be viewed as being the same as synthesizing. The procedures suggested for policy studies are more complex and on a higher cognitive level than the processes. For example, defining the problem may involve recalling, hypothesizing, analyzing, and other processes. And testing solutions involves the process of evaluating which was not singled out for emphasis in the report.

Fourteen thinking operations were proposed by Raths and associates (1966) for use in classroom instruction: comparing, summarizing, observing, classifying, interpreting, criticizing, looking for assumptions, collecting and organizing data, hypothesizing, applying facts and principles, decision-making, designing projects and investigations, and coding. Several of these are readily subsumed under processes proposed by others. For example, summarizing is a part of generalizing, criticizing is a part of evaluating, looking for assumptions is typically placed under analyzing, and designing projects and investigations may be viewed as examples of synthesizing. Decision-making is a high-level activity that involves a variety of processes, including analyzing, synthesizing, and evaluating.

Fraenkel (1973) suggested a mixture of communication skills and processes for use in the social studies: observing, describing, developing comcepts (classifying), differentiating, defining, hypothesizing, comparing and contrasting, generalizing, predicting, explaining, offering alternatives. Describing and explaining are communication skills that should be used with other processes as needed. Differentiating is clearly a part of comparing/contrasting, defining, and analyzing, not a separate process as typically used in the social studies. Offering alternatives may be used in connection with interpreting, general-

izing, and other processes when emphasis is placed on divergent thinking.

Two reports on processes for use in science education were analyzed. The first was that of the American Association for the Advancement of Science, Commission of Science Education, 1965 (AAAS). Eight basic processes and six integrated processes were identified, most of which are directly related to instruction in the social studies. The basic processes were: classification, inference, communication, measurement, numbers, observation, space/time, and prediction. The integrated processes were: formulating hypotheses, defining operationally, controlling and manipulating variables, experimenting, formulating models, and interpreting data. The writer has been unable to find justification for including a methodology of inquiry such as experimenting which includes a variety of processes in a set that includes such a process as interpreting. However, the last is useful in identifying processes that may be used in the social studies as well as in science education.

The second report in the area of science education was prepared by Costa, Lowery, and Strasser, 1972. In this report, inquiry processes were grouped into four categories:

Data Organizing Processes: recording, sequencing, comparing, classifying.

Data Using Processes: making analogies, inferring, theorizing, generalizing.

Theory Applying Processes: hypothesizing, defining operationally, model building, predicting.

Data Generating Processes: observing, measuring, experimenting, researching.

The list is a combination of general skills, specific processes, and molar activities that include several processes. For example, recording and measuring are skills that are useful in connection with observing, classifying, and other processes. Experimenting is a method of investigation that calls for the use of the entire set of processes. Researching may be used as a synonym for inquiring or investigating, although the authors give it a limited definition related to what is typically called "library research."

SUMMARY OF PROCESSES IN PROFESSIONAL MATERIALS

Processes	Authors							
	Bloom et al.	Sanders	Taba	Calif.	Raths et al.	Fraenkel	AAAS	Costa et al.
Knowledge	x							
Comprehension	x							
Application	x	x	x		x			
Analysis	x	x						
Synthesis	x	x						
Evaluation	x	x						
Interpretation		x	x		x			
Memory		x						
Translation		x						
Classifying			x	x	x	x	x	x
Generalizing			x	x		x		x
Differentiating						x		
Defining				x		x	x	x
Integrating							x	
Communicating				x			x	
Hypothesizing			x	x	x	x	x	x
Inferring			x	x			x	x
Explaining						x		
Observing				x	x	x	x	x
Describing						x		
Comparing/Contrasting				x	x	x		x
Predicting			x	x		x	x	x
Offering Alternatives								
Measuring							x	x
Using Numbers							x	
Space/Time							x	
Controlling Variables								x
Experimenting							x	x
Making Models							x	x
Summarizing					x			
Criticizing					x			
Decision Making					x			
Designing Projects					x			
Organizing Data					x			
Looking for Assumptions					x			
Coding					x			
Recording								x
Sequencing								x
Making Analogies								x
Theorizing								x
Researching								x
Imagining					x			

Processes in Materials for Students

Three series of social studies textbooks for use in elementary schools were selected for analysis to identify processes that were emphasized in the teaching process. The three were selected because all of them identified the processes and incorporated them in lesson plans in the accompanying teacher's manual.

Because many of the same points made above apply to the processes in students' materials, detailed discussion of each series is not presented in this section. Rather, a summary of the processes is presented in Table II.

TABLE II

PROCESSES IN MATERIALS FOR STUDENTS

Process	Series A	Series B	Series C
Recalling	x	x	x
Observing	x	x	x
Comparing/Contrasting	x		x
Classifying	x	x	x
Interpreting	x		x
Generalizing	x		x
Inferring	x		x
Hypothesizing	x	x	x
Predicting	x		x
Analyzing	x	x	x
Synthesizing	x	x	x
Evaluating	x	x	
Investigating			x
Applying		x	x
Organizing			x
Inventing			x
Relating			x
Value seeking			x
Categorizing			x
Recording			x
Extrapolating			x
Seeking and Recognizing Evidence			x
Supporting Statements with Evidence			x
Seeing Causal Relationships			x
Selecting			x
Collecting Data			x
Transferring Understanding			x
Translating			x
Recognizing			x
Identifying			x

III

A PROPOSED SET OF PROCESSES

Based on the preceding review and analysis of processes, thirteen processes were selected for further study. The selected processes may be defined to include other processes, many of which are synonyms for those in the proposed set. The selected processes are as follows:

Recalling and observing are basic to other processes because they constitute the student's primary source of ideas for use in inquiry. What a student can recall and what he can observe (in a broad sense that includes both direct and indirect observation) are what he brings to bear on a given problem. Under recalling may be subsumed such processes as remembering and recognizing (as distinguished from recalling without cues). Observing may be viewed as including collecting data, identifying, and seeking evidence.

Comparing/contrasting, classifying and defining are processes that are directly involved in processing data which have been recalled or observed by the student. These three processes are also used extensively in instructional materials. Differentiating may be subsumed under comparing/contrasting. Categorizing, organizing, and sequencing may be subsumed under classifying. Defining may take a variety of forms including the making of analogies.

Interpreting and generalizating, two closely interrelated processes, are essential to the effective use of multi-media and to the development of main ideas and principles. As used in instructional materials, translating may be subsumed under interpreting, and summarizing may be subsumed under generalizing.

Inferring, hypothesizing, and predicting call for the application of facts, concepts, and principles and are different enough as processes to call for separate attention. Under hypothesizing may be subsumed seeing causal relationships and supporting statements with evidence (when testing hypotheses). Extrapolating may be viewed as a means of predicting.

Analyzing and synthesizing are high level processes that call for the use of a variety of concepts and skills as various items are broken into parts or as parts are brought together into wholes. Coding is one form of analysis, and designing, creating, and model building may be viewed as synthesizing.

Evaluating is widely used as a process in social studies materials and encompasses a variety of processes such as criticizing, value seeking, judging, and appraising.

In the section that follows detailed definitions are provided along with a discussion of skills, focusing questions, and teaching strategies that may be used in connection with the processes.

Recalling

To recall as a part of inquiry is to selectively retrieve, remember, or recognize previously learned items related to the topic under study. Both cognitive and affective elements may be recalled as a given problem is investigated. An important side outcome for the teacher may be the identification of misconceptions, biases, or lack of interest-information that can be used to improve learning experiences.

Among the basic skills involved in the process of recalling are the abilities to: (a) use the defined question or problem to focus recall, (b) use concepts, themes, or other organizers as clues, (c) identify clues in charts, comments of others, and related sources, (d) identify procedures and materials as well as content, and (e) select recalled items that can be put to use in inquiry. Application of these abilities are illustrated in Charts 1-6 which highlight points to include in instruction.

The process of recalling can be improved by providing instruction on the following: setting a clear purpose for study and making sure that original learning has depth and is complete (e.g., learning all of the concepts in major landforms, resources, and other concept clusters); building conceptual models and using them to classify data as shown in Charts 5 and 6; defining of terms by students themselves so that they can state the meaning in their own words; identifying concepts in questions and using them as recalling clues; making notes, outlines and summaries; distinguishing items of immediate and future use; and having students put ideas in their own words and use them in discussion, reports, and other activities.

Recalling Needed Ideas	Focused Recall
What do we know that will help on this problem?	Identify information that is needed.
What information (data) do we have?	Identify similar questions or problems that have been studied before.
What concepts can we use?	Break the problem into parts and try to remember items related to each part.
What procedures can we use?	Identify concepts, facts or main ideas that may trigger remembering.
What materials do we need?	Identify feelings that may be used as clues.
What feelings do we have about it that may affect learning?	

Aids to Recalling	Clues to Use in Recalling
Clear definition of the problem.	Organizers such as production, goods, role, customs, region, equality
Concepts and main ideas related to the problem.	Key dates, persons, places, events.
Feelings aroused by the problem.	Classifications of activities, actions, trends, causes, problems.
Comments of others, data in charts, notes, outlines.	Procedures and materials used before on similar problems.
Related material in displays, maps, and other sources.	Difficulties encountered on similar problems and how they were handled.

Improving Retention	Building Models for Storage and Transfer of Learning
Have a clear purpose for study.	Identify key concepts around which data can be organized.
Get ideas the first time if possible, reviewing as needed to remember them.	State questions that include the concepts and can be used as organizers.
Find something exciting or interesting that will help you remember them.	Make outlines that include main headings and subheadings based on key concepts.
Organize data around known or new concepts and ideas making notes or outlines as needed.	State main ideas that show how key concepts are related.
Build and reorganize mental models, such as zones of a city, what to look for in studying a region.	Use the model and change it as needed improvements are identified.
Put ideas in your own words and use them in discussion and other situations.	Think of other situations in which the model may be used and how it should be adapted.
Think of how ideas may be put to use on other problmes, how they might be transferred.	

Charts 1-6

Focusing Questions

Questions used to focus attention on recalling are usually a part of the initiation of a study and may be intertwined with the definition of the problem. Examples are:

/hat can you recall about _____?
/hat have you learned before about _____?
/hat does _____ make you think of?
/ho remembers what _____means?
/hat feelings do you have about _____?
/ho can recall procedures that may be useful in studying _____?
/ho can recall materials that may be useful in studying _____?

Specific questions directly related to the objectives of learning experiences during a unit are also needed, for example.

/ho can recall how work is divided at home
What natural resources does every country need?
/ho can describe each type of major landform?
/ho remembers the civil rights guaranteed by the Constitution?

Teaching Strategy

The suggested teaching strategy (Chart 7) begins with definition of the topic under study so that students will have a focus for recalling. This is followed by giving attention to concepts, themes, or other organizers that can be used as clues. Clues also may be identified in comments of other students, bulletin board arrangements, related maps, or other data sources. Attention should be given to the recalling of usable procedures and materials as well as content. Attention should be given to feelings as appropriate during use of the strategy. Finally, those items that are most useful in further inquiry should be identified.

A STRATEGY FOR RECALLING

Procedure	Focusing Questions	Illustrative Application
Clarify the purpose, problem, question, or hypothesis.	Is the question clear? Who can restate the problem? Any questions?	How is work divided in our community? Is this question clear?
Focus recall on basic aspects, using concepts and other organizers as clues.	What clues will help us to recall important items?	What have we learned about dividing the work? In school? At home? Other places?
Identify recalling clues in students' comments, charts, photos, or other sources.	Do examples given so far make you think of others? How about checking the bulletin board?	Do the examples of food workers make you think of how others divide the work? Can you find clues on the bulletin board?
Recall procedures and materials as well as content.	How might we proceed to find out more about the problem? What materials will be helpful?	What activities can we use to find more examples? What materials do we need?
Sift out points related to the problem and put them to use in ongoing inquiry.	Which points will be most useful? How can we put them to use?	Which ideas can we use to study division of work in our community?

Chart 7

Observing

To observe is to perceive, examine, or focus attention on an object or activity with a purpose in mind. Observation is an intake process used to collect data essential to inquiry; it is guided by a purpose and may be direct or indirect. Direct observation involves use of the senses to gather data--looking, listening, touching, smelling, tasting. Indirect observation includes reading and listening activities in which secondary sources are used as well as the examining of pictures, maps, and other data sources.

Essential to effective use of the process of observing are the abilities to (a) identify a focus or purpose, (b) identify appropriate data sources, (c) identify data related to the purpose, (d) control feelings in order to "see it like it is," (e) make notes or other needed records, and (f) check observations for accuracy and completeness. Charts 8-13 illustrate the application of these abilities.

Focusing Questions

Model questions that may be adapted for use in a variety of units to focus attention on observing are:

What do we need to find out about _____?
How can we find out? Look? Listen? Read? Ask someone? Other ways?
What can we find in the _____? (picture, map, reading, etc.)
What data in this _____ can we use to test the hypothesis?
(film, report, table, etc.)
What special features of _____ can you find in this data source?
(Navajo family life, steel production, state courts, etc.)

Observing	Good Observers
What do we need to find out? What question or hypothesis can be used to guide observing? How can we find out? Look? Listen? Read? Ask? Other ways?	Know what they are looking for. Use questions, or hypotheses as guides.
Where can we find out?	Use direct observation--look, listen, touch, smell.
What shall we record?	Use indirect observation-read, watch films and other A-V resources, listen to tapes, etc.
How can we control our feelings to "find it like it is?"	See it like it is, not as they think it ought to be.
How can we double check what we find?	Check findings with others and against other sources.

Observing	Indirect Observations
Have a focus.	Reading documents, stories, books, and other materials
Use a question, concept, or hypothesis as a guide.	Listening to tapes, records, and people.
Identify major and minor items.	Asking people with special knowledge
Make records as needed.	Seeing films, filmstrips, and other visual sources.
Control feelings to see it like it is.	Examining models, objects, and other realia.
Check findings to be sure they are accurate.	

How Can We Use What We Observed?	Should we Use Direct or Indirect Observation?
To answer a question? Solve a problem? Test a hypothesis?	To identify urban problems?
To make an inference? Generalization? Prediction? Hypothesis?	To identify major urban services
To store for future use? Make a retrieval chart? Organize in other ways?	To identify needs for urban services?
	To identify features or renewal plans?
	To identify groups for and against renewal?

Charts 8-13

Teaching Strategy

The teaching strategy for observing (Chart 14) links questions or hypotheses that emerge from group planning to the identification and use of data sources. After the problem is defined the need for observing to gather data should be clarified and a focus should be established. With a focus or purpose in mind, attention should next be given to available sources of information. This should be followed by observing to identify items related to the purpose. Feelings should be explored, if necessary, so that any effect they may have on what students perceive can be accounted for. The need to make records should be explored, and finally, findings should be checked for accuracy and completeness.

A STRATEGY FOR OBSERVING

Procedure	Focusing Questions	Illustrative Application
Have a focus--a concept, questions, or hypothesis to guide observation.	What do we need to find out? What is the focusing question?	What are the purposes of the urban planning committee?
Consider available data sources and related mode of observation.	What data sources can we use? Can we find out by looking? Listening? Asking? Reading? Other?	What can we find in the news report on Tasks of the Urban Committee?
Control feelings so that perceptions will not be distorted.	Which points are directly related to the focusing question?	Which points can be used to indicate purposes of the urban committee?
Make notes or other records as needed for completeness and accuracy.	In what ways might our feelings--likes and dislikes--interfere?	How might urban needs we favor affect what we observe?
Check findings for accuracy and completeness.	What records do we need? How shall we make them?	Should we take notes? List points on the chalkboard? Make other records?
	How can we check our findings for accuracy and completeness?	Do we agree on key points? Do we need to reread the report to clarify questions?

Chart 14

Comparing/Contrasting

To compare is to identify similarities and differences in two or more items. To contrast is to identify differences in two or more items, or to set them in opposition to show differences. Students are comparing when they identify similarities and differences in roles of community workers, resources used by industries, agricultural activities in states or regions, and contributions of great men and women. Students are contrasting when they distinguish goods from services, identify differences between fruits and vegetables, distinguish hostile from friendly behavior, and identify differences between capitalism and socialism. Although the emphasis in comparing is usually on similarities and contrasting is on differences, comparing may be used to include both and is so used in this section.

The identification of similarities and differences calls for discriminating observation. Essential to the process are the abilities to: (a) identify characteristics to be compared, (b) identify similarities and/or differences in the features selected for comparison, and (c) summarize the likenesses and differences. Examples of the application of these abilities are illustrated in Charts 15-20.

Comparing/Contrasting	Questions to Guide Comparing
Observe to identify main features.	What features are most important?
Identify features to compare.	Which features should we compare? Why should we compare them?
Identify likeness and differences.	How are they alike? How are they different?
Summarize likenesses and differences.	How may we summarize the likenesses? The differences?

Our Model for Comparing Communities		A Model for Comparing Population in Two or More Areas	
Population	Major zones	Number	Settlement patterns
Location	Government	Growth rate	Areas of concentration
History	Urban problems	Ethnic Makeup	Central cities
Industry	Renewal plans	Distribution	Other cities
Transportation	Minority groups	Migrations	Predictions
Recreation	Special features		

Building a Model for Comparing States		Contrasting Countries on Civil Liberties
Explorers	Capitals	What are the differences in:
Settlers	Main cities	Freedom of thought
Indians	Industry	Freedom of speech
First towns	Agriculture	Freedom of worship
Growth	Recreation	Freedom to petition
What features should be added?		Freedom of association

Charts 15-20

Focusing Questions

Illustrative questions that may be used to focus attention on the process of comparing/contrasting are:

How are _____ and _____ alike? (work of mothers and fathers in the home, goods and services, imports and exports, etc.)
How are _____ and _____ different?
How can _____ be compared? Or, On what points can we compare _____? (jobs of community workers, these two states, etc.)
Who can summarize the similarities?
Who can summarize the differences?

Teaching Strategy

The teaching strategy in Chart 21 is designed to develop the three abilities noted above. Attention is given first to clarification of what is to be compared and to specific points of comparisons. Likenesses and differences are identified next in response to such widely used questions as How are they alike? and How are they different? Finally, similarities and differences are summarized.

A STRATEGY FOR COMPARING/CONTRASTING

Procedure	Focusing Questions	Illustrative Application
Clarify what is to be compared, identifying comparable features.	What did you see? Read? What features did you notice?	What urban problems did you find in these two cities?
Identify similarities and differences.	How are they alike? How are they different.	Which urban problems do both have? What special problems does each one have?
Summarize similarities and differences.	What are the main likenesses? Differences?	Who can summarize how they are alike? Different?

Chart 21

Classifying

To classify is to group, sort, or place items in categories or a sequence according to identified characteristics or other criteria. Students are classifying when they sort objects according to size, shape or color, group activities of community workers under such labels as producers or goods, arrange pictures around such themes as colonial life and pioneer life, and put population and other data on selected countries in columns on a retrieval chart. In each instance, defined criteria are used as a basis for classifying items in the appropriate category.

Classifications range from single stage to multi-stage, depending on the number of criteria being used (AAAS, 1968). Single-stage classifications are based on a single feature, e.g., grouping vegetables together. salads together. Additional features or criteria may be added depending on the need or purpose.

Whether single- or multi-stage, the process of classifying requires the development of the abilities to. (a) observe and identify the item to be grouped, (b) identify common and different features (comparing), (c) choose a basis for grouping, (d) naming or labelling each group (if not already defined), and (e) making other groups as needed for different purposes. Charts 22-27 illustrate the application of these abilities.

Grouping Things	Grouping Workers	Ways to Group
See how they are alike.	Which produce goods?	By uses--tools, materials, other items.
Put like things together.	Which produce services?	By appearance--color, size, other features.
Tell how they are alike.	Which work at home?	By relationships--parts of a whole, causes and effects, etc.
Name each group.	Which work in town?	

Questions to Guide Classifying	Why Should We Classify Items?
What features did you see? Read? Note?	To develop the meaning of a concept?
Which items have common features?	To clear up what is included in a definition?
How might they be grouped?	To store ideas for later use?
Why can they be grouped this way?	To compare and contrast items more effectively?
What should each group be called?	To identify how items are related?
What other groups might be made?	To help interpret, analyze, or evaluate?
What common features do they have?	To use for other purposes?

What Items Should be Added to
Our Retrieval Chart on Disposal of Wastes?

Kinds of Waste	Sources of Waste	Methods of Disposal	Expenses of Disposal
Paper	Households	Dumps	Collection
Bottles	Offices	Fills	Disposal

Charts 22-27

Focusing Questions

Three widely used means of classifying are by descriptive characteristics, function or use, and relationships. Descriptive characteristics include observable "surface features" such as color, size, shape, order, and position. Functions and uses include main activities or functions of families, urban services, and legislative, executive and judicial functions of government, while uses range from ways in which household objects are used to uses of resources in industrial activities. Relationships include causes and effects, how parts are related to a whole, and such ratios as production per man-hour and average income of families. Model questions that may be used to focus attention on each of the

foregoing types of classification are:

How can we group these _____? (fruits, houses, etc. by descriptive characteristics)
Which ones are _____? (red, large, nearest and other descriptive characteristics.
Which ones are _____ workers? (health, postal, etc., by function or activity)
How can these _____ and _____ be grouped? (causes and effects, events and time periods and other related items)
Which items are part of _____? (a dairy farm, steel production, etc., to show part-whole relationships)

Teaching Strategy

The teaching strategy in Chart 28 begins with the stating or listing of what has been observed, guided by specific questions. For example, rather than asking "What did we see on the study trip?" It is better to ask "What different workers did we see?" or other specific question related to what is to be classified. The next step is to list the items to be classified. During this phase such questions as "Can you think of others? and "What are some other items?: can be used to extend thinking. After comparing items and deciding on a basis for grouping, students should group them and label each group. Other possible groupings may be considered along with the reasons or purposes for making them.

A STRATEGY FOR CLASSIFYING

Procedure	Focusing Questions	Illustrative Application
Observe and identify items to be grouped.	What did you see? Hear? Find? Read? Note?	What items are shown in these pictures?(goods & services)
Compare items and consider ways of grouping them.	Which ones may be grouped together? Or, how might we group them?	How are some items alike? How are others alike?
Decide on basis for grouping.	Why can they be grouped this way? Or, How are these alike?	Which ones are things someone makes? Which are not things, but are useful work?
Name, label, or define each group.	What is a good name for each group?	Who has a name for each group? Which can be called goods? Services?
Consider other possible groupings, if appropriate.	What other groups might we make? How are they alike?	Are there other ways we can group them? How about work of mother? Work of father?

Chart 28

Defining

To define is to state or otherwise indicate the meaning of a word, map symbol, phrase, or problem. The meaning may be indicated by explaining it verbally, pointing to a picture or object, giving a demonstration, stating synonyms, making a comparison with a known meaning (analogy), or by stating the operations or behaviors that are included. A good definition is precise and clear, sets limits on what is included, is stated in different terms and is useful in further inquiry.

The most useful type of definition should be selected in any given situation. The folowing examples as stated by students illustrate the different types:

"Look, I'll show you what dipping candles means." (demonstrating)
"This picture shows what a tugboat is." (pointing to a picture, etc.)
"A governor is like a president only he runs a state." (analogy)
'Here are some synonyms for rapid: fast, speedy, swift." (synonyms)
"The glossary says that a vaquero is a cowboy." (glossary)
"The dictionary says that define means to state the meaning of...." (dictionary)
"The main things legislators do are: campaign for office, write bills, vote on bills, get things for supporters, make speeches, etc." (behavioral--stating what a person does)
"Population density can be figured by dividing the population of an area by the square miles in the area." (operational--stating operations to be performed)

Defining and classifying are frequently intertwined as students group objects or events to develop concepts and attach names to them. The process of classifying helps to clarify what should and should not be included. The defining of problems, issues, hypotheses, and inquiry questions calls for several definitions as terms and phrases are clarified, emotive aspects of terms are considered, and what to be included is identified.

Central to the process of defining are the abilities to: (a) recognize the need for defining, (b) identify an appropriate data source, (c) state or otherwise indicate a usable definition, and (d) identify and refine (if necessary) the most useful definition(s). See Charts 29-32 for illustrative applications of the foregoing abilities.

Focusing Questions

The following model questions may be used to focus attention on different types of definition and on feelings that may affect the meaning:

What do you mean by _____? Or, What does _____ mean? (producer, goods, urban function, etc.)
What is the meaning of _____? (freedom, injustice, etc.) What feelings do you have about it? How might feelings affect our definition?

What is a good way to clear up the meaning of this term? Using a picture or model? Demonstrating the meaning? Other?
Who can define _____ by telling what he does? (carpenter, judge, scout, etc.)
Who can define _____ by stating how it is figured? (average income per family, population density, etc.)
Which meaning(s) of _____ should we use? (bank, pollution, democracy, etc.) Which one best fits the context?

Ways to Define	Finding the Meaning
Give an example or show a picture.	Will a picture clarify it?
Tell what it is like.	Will an object or model show what you mean?
Demonstrate what you mean.	Can you demonstrate or act out the meaning
Describe what he does, e.g., A Judge ____.	Can you find the meaning in the way it is used? (context clue)
State other terms with a similar meaning (synonyms).	Does the prefix, root, or suffix indicate the meaning?
Sharpen meaning by stating terms with opposite meaning (antonyms).	Is it on the word chart? Is it in the glossary?
State how to do it, e.g. how to figure population density.	Should the dictionary be used?
Use the glossary or dictionary.	

Questions to Guide Defining	How May Feelings Affect the Definition of these Terms?	
What is to be defined? Word? Phrase? Map symbol? Behavior? Operation? Feelings?	Fairplay	Lobbyist
How is it alike and different from others we know?	Justice	Dictator
What is included? Not included?	Freedom	Majority
What kind of definition will be most useful? Example? Analogy? Picture? Demonstration? Behavioral? Operational?	Rights	Minority
Have you checked the definition? Did you use terms different from the one being defined? Is the meaning clear? Useful?	Demands	Democracy
	Poverty	Communism
	Police	Environment
	President	Pollution
	Politician	Ghetto

Charts 29-32

Teaching Strategy

The strategy in Chart 33 begins with clarification of the need for defining. If students cannot supply the meaning or there is a disagreement, such questions as the following may be used: Where can we find out? How can we find the meaning? A next step is to share definitions that students propose, followed by selecting and refining the most useful one so that

inquiry can proceed. The last step is critical with terms that have multiple meanings and the appropriate one must be selected in the context of its use.

A STRATEGY FOR DEFINING

Procedure	Focusing Questions	Illustrative Application
Recognize the need for defining	What do you mean by _____?	What does "carding wool" mean?
Identify a source to use if students cannot define it.	What source can we use to get the meaning?	Where can we find the meaning of carding wool?
Share definitions formulated by students	How can it be defined? What can define it?	Who can describe it? Tell or show what a person does?
Select and refine the most useful or appropriate definition.	Which definition(s) should we use? Why?	Which one best explains the carding of wool? Is the meaning clear?

Chart 33

Interpreting

To interpret is to explain the meaning, to state the significance, to translate in different terms, or to illustrate the thoughts and feelings one has obtained from an experience. Students are interpreting when they state: "The picture shows how they go to school." "The map shows where resources are located." "This story shows how tough it was for pioneers to pack up and leave their friends." In all of these examples students are indicating some of the meaning they got from an experience.

Interpreting may be defined more broadly to include inferring and other processes. It is not done so in this section because of the basic importance of accurate interpretation of data. Thoughts and feelings need to be clarified and expressed as they are derived from the study of pictures, maps, readings, and other resources. After interpretations are made and checked for reasonableness and accuracy, then one should move on to generalizing, inferring, or other processes.

The process of interpreting includes the abilities involved in recognizing, recalling, and stateing: (a) details and main ideas (e.g., facts about urban problems and problems that are reported as being common to most cities), (b) a sequence of events or steps in a process (e.g., events in a story, directions for making something), (c) similarities and differences (e.g., comparisons between groups, characters, places, etc.) (d) relationships (e.g., causes and effects of urban sprawl), (e) traits or qualities of people and special features of places (e.g., traits of a leader, special features of Chicago), (f) how something is organized (e.g., an article or report). Charts 34-39 show applications of the above.

Interpreting What We Find	Interpreting Data
What did you find?	Identify and describe the data.
How is it like other things you know? How is it different?	Identify likenesses, differences, changes, trends.
Which items are related to others? Can you tell why?	Identify and describe main ideas and supporting details.
What is most important? Least important?	Summarize the meaning or significance.
What is the main idea?	

How to Interpret	Interpreting Maps
Look for the intended meaning.	Check the title to note content.
Use titles, headings, the key on maps, and other aids.	Check the key to define symbols, colors, and scale.
Stick to the data, "telling it like it is."	Identify directions by finding the north arrow, parallels, and merideans.
State the main idea and supporting details.	Use colors, flow of rivers, contour lines, and hachures to identify changes in elevation.
State your feelings if they are part of your interpretation.	Identify relationships between items.

Aids to Interpretation of Reading Materials	Using Concepts and Main Ideas to Interpret Findings
Key concepts and ideas in the title, headings, subheadings.	How can we use <u>division of labor</u> to explain family activities.
Topical sentences, conclusions, and summaries.	How can we use <u>interdependence</u> to interpret trade between them?
Italics, footnotes, and marginal notes.	How can we use <u>equality of opportunity</u> to explain their position?
Pictures, charts, tables, and graphs.	How can we use <u>expectations of others</u> to explain his role?

Charts 34-39

Focusing Questions

Model questions that may be used to guide the interpretation of data in various instructional materials are:

What main idea(s) and supporting evidence did you find in this _____?
(film, reading, table, etc.)
Can you explain the diagram which shows the main steps in _____?
(location of homes and schools, travel time and terrain, etc.)
How can we ____ the main points presented in this material?
(summarize, demonstrate, act out, etc.)
What is your interpretation if you use _____ to explain it?
(specialization, interdependence, factors of production, etc.)

Teaching Strategy

The teaching strategy in Chart 40 beings with a focus on getting the intended meaning from a data source. Probing questions are used to get students to discuss main ideas and related evidence, relationships, important similarities and differences, or other significant items. The final stage of interpreting involves the summarizing, concluding, or explaining of the central meaning or significance of what has been found.

A STRATEGY FOR INTERPRETING

Procedure	Focusing Questions	Illustrative Application
Study the data source to get the intended meaning	What does this show? Contain? Tell? Present? How can we use the data?	What does this transportation route map show? How do the title and map key help to interpret it?
Identify and discuss basic data and main ideas.	What did you see? Find? Note for use? Which ideas are most important?	Who can describe the main transportation routes? What major cities are linked by them?
Identify and describe relationships, similarities, differences.	Which items are related? What similarities and differences are important?	How are transportation routes and location of cities related? How are the main routes alike? Different?
Summarize, explain, or conclude, being sure to stick to the data.	How can we summarize the key ideas? What can we conclude?	What can we conclude about Main routes and location of cities? How might we explain the relationship?

Chart 46

Generalizing

To generalize is to derive a principle or main idea from data. Two or more concepts are included in a generalization as shown in the following examples which range from low levels of generality and applicability to high levels: Many schools are located in the residential part of the community. All cities provide education, transportation, business, and other services. How people use their environment is influenced by their culture. Historical events have many causes, not a single cause. To qualify as generalizations, statements such as the foregoing should be based on evidence, widespread, prevalent, usually the case, based on two or more concepts, and applicable to most if not all members of a group.

Generalizing requires the use of comparing, classifying, interpreting and other processes prior to the act of deriving a generalization. Data

must be available, interpreted, and clearly understood before a generalization can be made. Essential to the process are the abilities to: (a) identify and describe the data to be used (e.g., data on industrial growth and growth of cities), (b) identify common elements or relationships (e.g., how industrial and city growth are related), (c) classify the data, and (d) link the key concepts together in a statement that fits the data but does not include them (e.g., Cities grew rapidly during the period of fast industrial growth). Examples of the application of these abilities are shown in Charts 41-46.

What Can We Say in General	How To Generalize
About the main problems cities are facing?	Get data from pictures, reading materials, and other sources?
About the work of urban planners?	Find what is common or general in the data.
About the purposes of urban renewal plans?	State a main idea that describes what is common or general.
About the main difficulties in renewal projects?	Check to find out if the main idea fits data in other situations.

How Can These Be Used In Generalizations?	Generalizing
Data or evidence on questions under study.	Have you identified essential facts?
Concepts such as role, rules, customs, culture, public services, authority.	Have you identified cause-effect, part-whole, or other relationships?
Themes such as Westward Movement, democracy on the frontier, rise of the common man.	What can you say in general? What can you conclude?
Values such as rights, freedoms, equality, concern for others.	Have you checked your generalization against the evidence?
	Can you give evidence to support your generalization?

Stating Generalizations	Questions to Guide Generalizing
Observe, interpret, and classify data.	Do you have the facts clearly in mind?
Identify common elements and relationships.	Have you interpreted the intended meaning?
State a tentative generalization that shows the main idea.	Have you summarized common elements and relationships?
Check the tentative generalization against the data.	Can you state a tentative generalization? Does it fit the data?
State a final generalization that really fits the data.	Have you made a final generalization that fits the data?
Check other situations to see if the generalization applies to them.	Do you need to find out if the generalization applies in other situations?

Charts 41-46

Focusing Questions

The following model questions may be used to focus attention on the formulation of different types of generalization:

In general, what can we say about _____? (the work of mothers, uses of lumber, the role of mayors, etc.)
According to the evidence, what are the relationships between _____ and _____? (scarcity and prices, supply and demand, travel routes and location of cities, etc.)
What is the main difference between _____ and _____? (producers and consumers, the work of mayors and governors, etc.)
What are the main ways the _____ have changed? (homes, cities, work of mothers, the New England States, etc.)
What general statement best describes _____? (the advantages of dividing the work, the weaknesses in the Articles of Confederation, how specialization and interdependence are related, etc.)
What generalization can we draw from _____? (the evidence we have collected, the data in these sources, etc.)
According to the data, where are _____ usually located? (homes, schools, airports, factories, cities, wheat farms, etc.)

Teaching Strategy

The teaching strategy begins with identification of data on which the generalization is to be based. This is followed by idnetification of common elements and the formulating of a tentative generalization. The tentative generalization is checked against the data and revised as needed, with attention to conditions or other qualifications. Further checking of the generalization may be made against other data to find out if it is applicable in other situations. This last step is essential to the derivation of high-level generalizations of broad applicability.

A STRATEGY FOR GENERALIZING

Procedure	Focusing Questions	Illustrative Application
Get the data (facts) clearly in mind and interpret them.	What did you find? See? Hear? Read? Note?	What did you find to be major governmental activities at the local and state levels?
Identify common elements, relationships, or main idea	What common elements did you find? Which items are related?	What common activities did you find? (executive, legislative, judicial)
Make a tentative generalization	What can we say in general?	What seems to be a sound conclusion about activities common at both levels?
Test the tentative generalization against other data	Does our generalization hold up as we check other data?	What does this report (film, filmstrip, reading) show to be main governmental activities at both levels? Is our generalization OK?

Chart 47

Inferring

To infer is to state a logical consequence, to base a conclusion on a premise or given data, to read between the lines. Students are inferring when they state how people portrayed in a story or picture may feel about what they are doing, the values that may be reflected in a mural, the hidden motives of a writer, how a conclusion on a pollution problem is based on a premise, the possible consequences of the behavior of an individual or the action of a group. An inference is a step beyond literal interpretation of what has been observed; and it is more specific than a hypothesis, although an inference drawn in a specific situation may be generalizaed into a hypothesis for testing in other situations.

Competence in inferring requires the development of the abilities to: (a) identify inferences and distinguish inferences from observations, e.g., "It wasn't stated in the reading, but it seems to follow." "Even though it wasn't stated, I think he was happy about what happened."; (b to state the extent to which an inference is related to what is given or what was observed, e.g., "Does all of that follow, or only part of it?" "How well does that describe what their feelings may have been?"; (c) checking the consistency of an inference, e.g., "How could both of those outcomes be possible?" Can you explain why you think some were happy and some were sad?" "Is that consistent with what we know about the group?"; (d) change an inference when new evidence or a different premise is used, e.g., "Maybe they didn't feel sad about moving afterall, because Bill knew he would have a friend in the new neighborhood." Oh, if that was his motive, then he would join the group, not work against it."; (e) checking a conclusion against the premise on which it is based, e.g., "What is your reason for that conclusion?" " He belongs to the Conservation Club so naturally he's against cutting the trees for a road through the park."; and (f) check further on a questionable inference, e.g., "Do we have enough evidence to believe that his motives are to help all minority groups?" "We better read more to find out if the author is really assuming that people get what they deserve if they don't vote." See Charts 48-53 for examples of applications of these abilities.

Focusing Questions

The following model questions are illustrative of those used to focus attention on inferring:

How do you think they must feel about _____? (moving into a new neighborhood, the new civic center, his election, etc.)
How do you think they must have _____? (felt about it, learned to do that, done so much in such a short time, etc.)
Why do you say that _____? Or, Why do you think that _____? (they felt happy, he did it to help others, the writer of the article is biased, etc.)
What might be _____? (the next step, his reason for doing it, the effect of that decision, etc.)

What do you suppose someone would do if _____? (he were in that situation, some individuals violated the rules, appointed to the pollution control committee, etc.)
Why do you suppose _____? Or, What are the possible reasons that _____? (his behavior surprised them, they decided to take that action, these areas are more populated than others, etc.)
What _____ seem to be reflected in this _____? (values in this story, motives in his behavior, assumptions in this report, etc.)
How could they possibly have _____? (made that mistake, anticipated his decision, known ahead of time, etc.)
Given this situation, what can you infer about ____? (feelings, consequences, what might be produced, etc.)
Given these _____ what can you infer about _____? (resources--infer type of production or trade, climatic conditions--infer type of housing or crops, etc.)

How to Infer Feelings	Inferring
Get the facts clear. Clarify what the situation is like. Imagine you are in the situation. Think of how you and others must feel in the situation. Check to see if your idea makes sense with what is given. Find out if others agree.	Do you have evidence or an idea as a basis? What is a reasonable extension of the evidence or idea? Can you state possible outcomes? Reasons? Feelings? Other extensions of the evidence or idea? Can you state how your inference is related to what is given? Do others think that your inference is reasonable?
Good Inferences	**Checking Inferences**
Are related to what is given or has been observed. Follow from the evidence or an assumption. Can be checked against data or ideas (premises). Make sense; are reasonable, logical, believable, possible.	Does it fit the facts? Is it related to a given idea? Does it really follow from what is given? Does it make sense to you and to others? Are other ideas more reasonable, likely, believable?
What to Infer	**Can You Infer?**
How someone may feel in a given situation. What someone may think about a problem. What someone may say or do in a situation. What the motives or purposes of an individual may be. What behavior or action may follow from an incident. What the reasons may be for an event.	Why the population is greater in this area of our state? What may be produced from the resources they have? What intergroup problems they may have from the information on population makeup? What the climate may be from the data on location and elevation? What their feelings about neighboring countries may be from the treaties they've signed?

Teaching Strategy

A basic step in the strategy outlined in chart 54 for inferring is to observe and interpret what is given so that the situation is clearly understood. Such questions as What did you find? What is most important? and What is stated or given? help to clarify the situation and to build readiness for extending the evidence or using an idea to draw an inference. This may be followed by having students state possible feelings, causes, or reasons that are related to what is given. After several inferences have been made attention should be given to the basis for making them. During this phase the inferences should be checked for their reasonableness with special attention to the questions: Do they make sense? How can they be imporved? Do they fit what is given?

A STRATEGY FOR INFERRING

Procedure	Focusing Questions	Illustrative Application
Observe and interpret what is given.	What did you find? See? Hear? Read? Note?	What did you find to be the most exciting event in the story on Pioneer Life?
State an inference about feelings, causes, reasons, etc.	How do you think they might feel about _____? What might have caused _____?, etc.	What feelings do you think the pioneers had about these events? Dangers? Kind of work? Isolation? Other?
Identify basis for inferences, checking reasonableness.	What is your reason for saying (believing) that? Why do you say that?	Who can explain why you think they felt like that? How might anyone feel in that kind of situation?

Chart 54

Predicting

To predict is to forecast, to prophesy, to anticipate what might happen. A prediction is based on relevant information but goes beyond it to identify what may happen in (a) a different time dimension (what future population may be), (b) a different sample (what one city may do to curb pollution because of what others have done or plan to do), and (c) a related activity or topic (an increase in steel production because of projected increase in car production). As with inferring and hypothesizing students should be well grounded in the area selected for prediction, both process and content wise, if sheer speculation and guessing are to be avoided.

Students are predicting when they state what may happen next in a story, what the future of railroads may be, how a group may react to new rules, what plan may be approved to combat pollution, the problems that may be expected if population continues to increase at the same rate in a given area, who may win an election, and where new housing developments may be located. The foregoing may be distinguished from hypothesizing which calls for the planing of a test. One must "wait and see" if his prediction is right, e.g., wait to see how the story comes out, wait until the election

is over, or wait until decisions are actually made on the location of a housing development.

Predicting includes the abilities to find causes or conditions and their related outcomes or effects (e.g., the problems that do arise when there is overpopulation), to identify trends or directions of change (e.g., the shift from passenger to freight traffic on railroads), and to identify steps in a sequence as a basis for projecting what may follow (e.g., patterns of migration from inner city areas to the suburbs). Specific attention needs to be given to the ability to project data (extrapolate) and to fill gaps in data (interpolate) as tables, graphs, charts, steps in a sequence, or lists of trends are being used to make precictions. Other processes are put to use as students define given condition, interpret data in graphs and other materials, analyze data to weight factors or conditions, find or make generalizations to guide predicting, and draw and assess inferences as to what may happen next. Examples of the application of various abilities and processes are illustrated in Charts 55-60.

Focusing Questions

The following model questions are illustrative of those used to make different types of prediction:

Predicting Behavior or Action

- What do you think _____ will do next? (person, group, character in a story, committee, legislature, etc.)
- What do you think they (he) will do if _____? (Billy does not find the lost bicycle, the pollution laws are passed, the treaty is signed, the original boundaries are restored, ect.)

Predicting Problems or Consequences

- What do you think will happen if _____? (the school bonds are not approved, new housing is located on the outskirts of town, aid to African countries is stopped, etc.)
- What do you think will be the main effects of _____? (the urban renewal project on business, their decision to move aheah with low-cost housing, their intervention in the Middle East, etc.)

Predicting Particular Events

- What do you estimate the _____ will be in ten years? (school enrollment, population of our state, production of steel, etc.)
- Where do you think they will locate the _____? (new school, shopping center, factory, nuclear power station, etc.)

Thinking Ahead	Types of Prediction
What do you think will happen? Why do you think that will happen? What will be needed if that is to happen? If it does happen, what may follow?	Different time: What will _____ be in the future? Related activity: If _____ (wheat production) changes, how will _____ (price) change? Different sample: Will that city have a renewal like this one did?

Questions for Predicting	Ways to Predict
What data should be found, organized, and interpreted? How should the data be classified to show the basis for predicting? What principle(s) should be used to make the predictions? Which predictions are most reasonable in terms of the evidence?	Identify what usually happens in a given situation. Find the causes and then find what usually follows. Identify a trend or direction of change and extend it. Put data in a table, find changes, and project them. Make a graph and extend it.

What Do You Predict	Checking Predictions
What new laws on water pollution may the legislature pass? What may happen to agriculture after the new dam is finished? What may happen to the environment after the dam is built? What problems can we expect if the anti-pollution program is approved? If it is not approved?	Basis: What change or process is involved? Conditions: Under what conditions will the change occur? Probability: What is the liklihood of its occurence? Consequence: If it does occur, what might be the effect?

Charts 55-60

Teaching Strategy

After defining what is to be predicted, attention should be given to the basis for making predictions. Available data should be reviewed, possible trends should be identified, and ways of projecting data should be explored. Tentative predictions should be made, and checked against the data; reasons for making them should be discussed in detail. Attention should be given to any data or factors that may have been overlooked. If new data and related factors are discovered, changes should be made in the predictions.

The questions included in the model strategy (Chart 61) should be varied to fit differing situations. For example, after the problem is clear, predictions may be invited by asking: What do you think will happen if _____?

Or, What do you think _____ will be like? In checking data to find a basis for predicting, alternate questions are: What is needed for that to happen? Why should that be expected? Why do you think that is likely? To encourage divergence in predictions students may be asked Who has a different idea? What else might happen? Questions to use in getting students to explore related conditions or factors are: What else is needed for that to happen? What else should we consider?

A STRATEGY FOR PREDICTING

Procedure	Focusing Questions	Illustrative Application
Clarify what is to be predicted.	What changes (trends, developments) are shown here? What might we predict from this evidence?	What do these data show about population growth in our community? What changes can you find?
Analyze the data to find a basis for predicting.	What is a good basis for making predictions?	How much growth was there during each period?
Explore possible predictions.	What predictions can we make? What do you think will happen?	What do you think the growth will be during the next period?
State reasons or basis for the predictions.	Why do you think that will happen? How can you support your prediction	What was your basis for the prediction? How many think the growth rate will be the same?
Consider related data, causes, or conditions that may have been overlooked	What else may be important to consider? Are other facts needed?	What about the reports on decreased birth rate and lack of land for houses?
Modify predictions to fit new data or conditions.	How should we change our predictions? How can we use new data to improve our predictions?	How should we change our predictions because of the data on birth rate and lack of land?

Chart 61

Hypothesizing

To hypothesize is to state a tentative explanation that can be tested, to propose a solution that may be tried out, to state a tentative generalization that is to be tested, to state a reasoned hunch or educated guess that can be checked, to extend an inference from a specific situation to all or several similar situations. A hypothesis is more general than an inference, is tentative and provisional (conditions are specified), is based on data, experience or a principle (theory), is testable, and is a guide to further inquiry. Students are hypothesizing when they state or ask: It seems that prices go up when something becomes scarce. All families seem to divide the work. Since people have common needs, all cities must provide basic services such as transportation, housing, etc. Is the role of governors the same in all states? Do all cities have pollution problems? Why do single-product countries have serious economic

problems? If they have the right climate and soil, then they probably produce wheat. If it is a major city, then it must be located by major transportation routes.

The examples below illustrate three different forms in which hypotheses are stated. Students should have experience in stating and using each type. All of the following should be viewed as tentative and open to testing:

> Do all families provide food, shelter, clothing, and security?
> If it is a family, then food, shelter, clothing, and security must be provided.
> All families provide food, shelter, clothing, and security.
>
> What reasons did people have for moving westward?
> If people moved westward, they moved for different reasons.
> (or, ...they moved to get land, find gold, start a new life, etc.)
> People moved westward for many reasons, not a single one.

Hypotheses relate two or more items, indicate a condition or "what is given," and state what usually follows the stated condition or given. For example, the question "What can the produce with these resources? indicates a relationship between two items, with resources given and what they produce as the consequence or outcome to be investigated. Similarly, the if part (If the work is divided...) states a condition or cause and the then part (... then more will be produced) states an effect or outcome to be studied.

Hypotheses may be generated by: (a) recalling experiences, for example, recalling activities of mothers known to students and hypothesizing that "All mothers have a similar role;" (b) using related concepts or a principle such as the resources needed to produce iron and hypothesizing "Areas with coal, limestone, and ore produce iron;" (c) analyzing data to discover relationships, for example, data on location, elevation, and other climatic factors to hypothesize weather conditions in similar regions in the winter or other seasons; (d) generalizing an inference about one or more specific cases, for example, changing "Our city has several urban problems" to "All large cities have common urban problems;" (e) by drawing an analogy that can be tested, such as "A governor's role is like a mayor's except he administers a state instead of a city;" and (f) proposing a plan for curbing pollution, improving safety, or other problem that can be checked against what has worked in several places.

In testing hypotheses, it is customary to test deductions (inferences) from the hypothesis rather than the hypothesis itself. For example, from "If rules are changed, the roles of leaders and followers change" may be derived such testable statements as: "Since there are new rules for our committees, the chair- and committee members must change their acitivites." Or, "Now that the city charter is changed, the mayor and city council

members will play different roles."

Hypothesizing includes the abilities involved in inferring and generalizing. In addition, the student must be able to identify relationships and synthesize them in a statement that is testable. The ability to identify cause-effect, sequential, and other relationships is critical, as indicated in the focusing questions that follow. Charts 62-67 show applications of various skills and related questions.

Focusing Questions

Questions designed to guide hypothesizing should focus on general relationships rather than specific instances. For example, the focus should be on the location of cities, industries, or other items in general, not a particular one. Model questions that may be used to stimulate hypothesizing about various relationships are:

Cause-effect

What are the main causes of _____? (population growth, urban decay, pollution of water, inflation, revolutions, etc.)

What usually happens to _____ when _____? (production when the work is divided, a committee when their chairman holds to the rules, family budgets when there is inflation, a candidate when his part is split, etc.)

Place

What is generally believed to be a good location for ____? (schools, forts, cities, wheat farms, etc.)

If people live in _____, what problems can they expect? (suburbs, inner city areas, deserts, communist countries, etc.)

Part-whole

Why do _____ usually _____? (members of a family usually divide the work, community workers usually specialize, cities usually have different zones, political systems usually have three branches of government, etc.)

How are the different _____ related to _____? (roles of community workers related to basic needs of families, regions of our country related to over-all agricultural production, activities of legislators related to functions of government, etc.)

A Good Hypothesis	Hypothesizing
Is a question, statement, or if-then proposition that can be answered or tested	Should we state it as a question, statement, or if-then idea?
Shows how two or more items are related.	What evidence, principle, or experience can we use as a basis?
States what is given and what to look for.	What should be stated as <u>given</u> and what should we <u>look for</u>?
Is a tentative generalization of data or inferences.	What cause-effect or other relationship is involved?
May be drawn from experience, evidence, inferences, principles, theories.	Does it apply to all or most cases, not just a particular one? Can it be tested?

How Can the Following Be Completed?	Stating What Usually Happens
If workers specialize, then dependence on others _____.	What usually happens when one part of an ecosystem is damaged?
If the supply of an item is greater than demand, the price _____.	What environmental problems usually arise in densely populated cities?
If a place has a Mediterranean climate, then living conditions usually are _____.	What usually happens when building construction exceeds the rate of forest renewal?
When people migrate, the main reasons usually are _____.	What benefits may be obtained from recycling of wastes?

Hypothesizing Relationships Between Items on Maps	What Hypotheses Can be Made About These Related Items ?
How are these related?	
Travel routes and cities	Climate and nearness to oceans
Travel routes and terrain	Climate and elevation
Cities and Terrain	Climate and mountain systems
Cities, travel routes, and terrain	Climate and wind systems
	Climate, wind, mountains, elevation, oceans
Elevation and vegetation	Land use and terrain
Elevation and agriculture	Land use and climate
Elevation, vegetation, and agriculture	Land use and culture
	Land use, terrain, climate, and culture

Charts 62-67

<u>Quantitative</u>

How are _____ and _____ related? (price and scarcity of items, time and mode of transportation, population of cities and pollution problems, etc.)

If production is increased by given amounts, what usually happens to _____? (cost, profits, number employed, etc.)

<u>Analogous, or Comparative</u>

How are the roles of _____ and _____ alike? (mothers and teachers, mayors and city managers, presidents and prime ministers, etc.)

How are ____ and _____ alike? (making bread at home and in a bakers, producing wheat and rice, being a judge and an arbitrator, etc.

Sequential

What are the main steps in _____? (raising crops, processing wool, passing a bill, negotiating labor disputes, etc.)

How can we best explain _____? (changes in the seasons, why large urban centers have emerged, changes in relations between countries in Latin America, etc.)

Teaching Strategy

The strategy for hypothesizing (Chart 68) begins the stating of propositions which show how two or more items are related. The statements should be more general than an inference because a good hypothesis covers most if not all cases or instances under study. By asking such questions as What usually happens if . . . or How are these items related in most situations? it is possible to get students to think in more general terms than when they are inferring. After students state tentative hypotheses and give reasons for them, attention should be given to the refining of their statements so that they can be tested. This should be followed by setting up a plan for testing the hypothesis, the carrying out of the plan, and discussion of the findings. Finally a decision should be made as to whether or not additional evidence is needed. If so, another test may be devised.

A STRATEGY FOR HYPOTHESIZING

Procedure	Focusing Questions	Illustrative Application
State preliminary hypotheses which show relationships	What usually happens if _____? What is the effect of _____? How is _____ related to _____?, etc.	What may happen if we divide the work in making party favors? Will more or fewer be produced?
State reasons for preliminary hypotheses.	Why do you think that usually happens? Why do you say that?	Why do you think more will be produced? What reasons can you give?
Refine the statement so it can be tested.	How can we state our idea so that it can be tested?	How can we sharpen our statement? (If the work is divided mor favors will be produced than by individuals working alone).
Identify essential conditions and procedures for testing.	What is a fair way to test the hypothesis? What procedures and materials are needed?	How can we test our idea? What tools and materials do both groups need? What other conditions are essential?
Analyze the data to find if the hypothesis is supported.	Do the findings support the hypothesis? Would we get the expected outcome?	Which group produced more? Who can summarize and explain the findings?
Decide if more evidence is needed.	Do we need more data? If so, how may we gather it?	Are we sure of our findings? Do we need to run another test?

Chart 68

Analyzing

To analyze is to take apart, to divide, to identify elements, relationships and principles. The focus of analysis may be on (a) parts, kinds, types, groups, (b) qualities, objectives, motives, assumptions, (c) common elements in several events or different elements in a single event, (d) causes, reasons, effects, consequences, organizing principles, or (e) time/space elements and relationships. Examples are the roles of different workers, causes of environmental problems, qualities of leaders, values held by early settlers, time needed to transport items in different ways, and relationships between travel routes and location of cities.

Analysis is a high-level process involving observing, comparing, classifying, and other processes noted above. Central to the act of analyzing are the abilities to identify how the whole should be broken down into parts, (b) defining each part clearly, (c) identifying and classifying data related to each part, and (d) stating a summary or conclusions about each part. Applications of the abilities are shown in Charts 69 - 74.

Focusing Questions

The following model questions further elaborate the nature of analysis and illustrate different types of analysis that are frequently made:

Parts or Elements

- What are the main _____? (parts of this picture, mural, reading selection, etc.; regions of this country; time periods in the growth of our state, etc.)
- What _____ can we find in this data source? (uses of resources, roles of workers, motives of individuals, etc.)
- What did _____ break the problem or topic into these parts? (author, artist, leader, etc.)

Relationships

- How are the steps in _____ related? (making bread, passing a bill, the leader's rise to power, etc.)
- How are the parts of this _____ related? (story, report, mural, etc.)
- How were _____ relationships emphasized in this source? (time, space, cause-effect, sequential, quantitative, analogous).

Organization or Structure

- How are _____ used to organize this material? (problems, activities, regions, time periods, concepts, themes, values, etc.)
- What _____ can we use to organize and present our ideas? (topics, themes, headings, etc.; pictures, objects, maps, etc.)
- Why did the _____ arrange the ideas (or materials) in this way? (speaker, author, artist, etc.)

Questions for Analyzing	Steps in Analyzing
What is to be broken down into parts?	Describe what is be be analyzed and state how an analysis will help.
What parts are most important?	Identify the main parts or features to analyze.
What is a useful definition of each part?	Define each part to guide the process.
What data should be put under each part?	Interpret and classify data under each part.
How are the parts related?	Describe relationships among the parts.
What can we conclude?	State a conclusion or main idea.

Analyzing Stories	Analyzing Pictures
What are the main parts?	What main things are shown?
How does it begin? Move ahead? End?	What is the central idea? How are other ideas related to it?
In what order are the main events presented?	How can we use the ideas to answer questions?
How are you feelings about characters related to what they said or did?	How do reactions or feelings aroused by it affect what we see in it?

Analyzing Arts and Crafts	Analyzing Data Sources
What tools and materials are used to create them?	Is it reliable? Accurate?
How are they used in daily living?	Do the facts check with others?
What feelings, hopes, customs, or values do they seem to represent?	Does it contain biases? Opinions? Inconsistences?
Why are they liked by the group which has them?	Have others reported similar findings? If not, are there good explanations?
	Who is the author? What are his qualifications?

Charts 69-74

Teaching Strategy

After clarifying the need for breaking the topic or problem into parts, attention should be given to ways in which it might be analyzed, i.e., causes, regions, etc. as shown in Chart 75. The meaning of each part selected for analysis should be defined to guide the identification and organization of data. After data are classified under each part and explored, a summary or conclusion should be stated.

A STRATEGY FOR ANALYZING

Procedure	Focusing Questions	Illustrative Application
Identify useful way(s) to break the problem into parts.	How can we break the problem into parts? What main parts (types, reasons, causes) should be studied?	How can we break down our question on urban land use? What are the main types of land use in cities?
Define each part clearly.	What is the meaning of each part? What does each part include?	How can we define each type? Commercial? Industrial? Residential? Recreational? Other?
Identify and organize data related to each part.	What information do we have on each part?	What data can we classify under each type of land use?
State summary, conclusion, or explanation, based on the analysis	What does our analysis show? What can we conclude?	Who can summarize the types of land use in order from greatest to least? How might we explain the differences?

Chart 75

Synthesizing

To synthesize is to bring parts together into a meaningful whole, to integrate, to create a new product. Parts or elements are put together to form a unified structure around a key concept, theme, question, principle, or other organizer. The completed synthesis may take the form of an original oral or written report, exhibit, map, mural, dramatization, or other creative product. A well-made synthesis is original and creative for the individual or group that made it.

Synthesizing brings skills in analyzing, interpreting, generalizing and other processes into action. In addition, a new product is created. Central to the process are the abilities to: (a) analyze the parts to be synthesized and identify relationships among them (e.g., main aspects of Navajo family life), (b) identify a theme or other organizer to use (e.g., roles of members of the family), (c) identify effective means of presentation (e.g., pictorial, use of objects, diagrams, etc.), (d) identify the form of what is to be produced to combine the parts (e.g., booklet, mural, exhibit, etc.), and (e) make a plan or plans and proceed to complete the synthesis (e.g., an exhibit that combines, pictures, stories, and objects, around the theme of Navajo family life). The preceding abilities may be put to use in variable order as students think creatively about the parts to be synthesized. See Charts 76-81 for examples of application of the skills.

Synthesizing	Presenting Ideas Creatively
What parts are to be put together?	Define what is to be put together.
How can we show relationships among parts?	Identify and describe the main parts and relationships among them.
What is a new way to arrange or organize them?	Identify new ways of putting them together.
What is an effective form of presentation?	Decide on the best way(s) and move ahead.

Putting Ideas Together in New Ways	How Can We Use These to Combine Ideas in New Ways?		
Describe the main parts.	Models	Flow charts	Rhythms
Identify a theme or principle to use as an organizer.	Murals	Diagrams	Dances
Describe new ways to combine them.	Maps	Timelines	Games
Make a plan and use it creatively.	Reports	Stories	Simulations
	Booklets	Poems	Dramatization
	Scrapbooks	Exhibits	Role playing

Presenting Ideas on Community Life	Using Forms of Presentation in New Ways
What to present: Early settlement and growth? Main zones of the community? Transportation networks? Other items?	How can we use reports in new ways to combine ideas?
How to present them: Pictures? Charts? Maps? Other means? Booklet? Reports? Exhibit? Other form of presentation	How can we use an exhibit to show relationships in new ways?
	How can we use role playing or dramatization to show feelings?
	How can we combine two or more forms of presentation to portray ideas in new ways?
	How can we modify forms of presentation to serve different goals?

Charts 76-81

Focusing Questions

The following questions are illustrative of those that may be used to spark creativity as the process of synthesizing is put to use:

How can we show the main features of ___ in a new way?
(living in the neighborhood, the Westward Movement, etc.)
Who can think of a good way to use ____? (pictures, reports, stories, objects, other items)
How can thoughts and feelings of most importance be highlighted?
(pictures, stories, a mural, etc.)
What _____ will be useful to organize or arrange the parts?
(concept, theme, main idea, etc.)
What form of presentation should we use? Scrapbook? Booklet? Mural? Flow Chart? Other?

What is a good _____ to use as we move ahead? (plan, procedure, etc.)

Teaching Strategy

Special attention should be given to creativity as the teaching strategy presented in Chart 82 is used. The desired outcome of synthesizing is a new and original product created by the students. If originality is not evident, the activity is better classified as generalizing, interpreting, or other process depending upon the operations that were involved.

The strategy begins with a focus on what is to be synthesized. The main parts or items to be combined are typically considered next and followed by considering organizing ideas and ways of combining the parts. Openness to ideas is essential to the tapping of student's creative potential as they suggest themes or other organizing ideas and as they ponder the use of exhibits, murals, or other forms of presentation. After exploring alternatives, students should make plans that will enable them to preceed with the synthesis. Openness to changes that may lift creativity to higher levels should be maintained throughout.

A STRATEGY FOR SYNTHESIZING

Procedure	Focusing Questions	Illustrative Application
Clarify the purpose, or what is to be produced (synthesized).	How can we bring together the main ideas on this topic in a new way?	What are some new ways we can show major aspects of Frontier Life?
Identify basic parts or items to include.	What are the most important items (ideas, activities) to include?	What should we include? Shelter? Clothing? Food? Recreation? Protection?
Identify organizing idea( ) and form(s) of presentation.	How should the parts be organized (arranged, shown, portrayed)?	What theme(s) might we use? What form(s) of verbal and pictorial presentation should we use?
Decide on fruitful plan(s) and proceed with the synthesis.	What plan(s) do you prefer? Why? What is needed to proceed?	What theme(s) do you prefer? Why? What form of presentation? Mural? Scrapbook? Report? Dramatization?

Chart 82

Evaluating

To evaluate is to judge, to determine worth, to assess in terms of objectives, standards, or criteria. Students are evaluating when they appraise plans for classroom activities, asses the effectiveness with which individual and group responsibilities have been carried out. judge the merit of proposals for urban renewal, rank items in order of quality, make a critical analysis of reading materials, and make judgements of the actions of individuals and groups under study. The desired outcome of such evaluating activities is a judgment based on clearly defined standards and supported by adequate evidence.

Evaluation is used extensively in ongoing and formative activities as well as in culminating and summative experiences. Various processes may be assessed as they are being used by considering such questions as: Is this an adequate definition? How can we improve this classification? How should we change our hypothesis? Discussions, planning sessions, and other activities may be assessed in light of standards which students have helped to define. The adequacy of evidence, qualifications of an authority, and the consistency of a line of argument may be appraised as a part of analysis of data sources. Proposals, plans, situations, individual behavior, and group actions encountered in instructional media may be judged in light or relevant values. Thus evaluation may be an integral part of other processes and activities as well as a process that should be given singular attention as diagnostic, formative, and summative appraisals are made.

Essential to the process of evaluating are the abilities to: (a) define what is to be evaluated, (b) clarify objectives, functions, roles, tended uses of that which is to be appraised, (c) to state or identify appropriate standards, (d) to gather and analyze related evidence, (e) describe the consequences of various alternatives, and (f) to state why a given judgment has been made. Charts 83-88 show applications of these skills.

Evaluating	Judging
Identify and define what is to be appraised.	What is to be judged? What is its intended use or purpose?
Define the standards to use.	What standards should be used?
Gather and interpret evidence related to each standard.	What data can be found for each standard?
Summarize the extent to which each standard is met.	How adequately is each of the standards met?
Make a judgment, giving reasons for your appraisal.	How should it be judged? Why should it be judged that way?

Evaluating Statements	Evaluating Definitions
Is it a fact?	Is it clear to you?
Is it an opinion?	Is it clear to others?
Is it warrented?	Does it tell what to include?
Is it supported by evidence?	Are different terms used?
Is it reasonable?	Can you use it?

Appraising Alternatives	Evaluating Interpretations
What is the problem or purpose?	Can you state the intended meaning?
What are the different proposals or plans?	Did you stick to the data, "telling it like it is?"
What standards should be used to assess them? Are they fair?	What relationships did you find?
What will be the outcomes or effects of each plan?	Can you state the main idea and supporting details?
Which plan will have the most desirable outcomes in terms of the standards?	Can you summarize it in you own words and state what is most imp't or significant?

Charts 83-88

Focusing Questions

Focusing questions are needed for two different types of evaluation. The first type involves the use of internal evidence or standards for assessing the reports, documents, reading selections, and other materials. Typical standards are accuracy, consistency in use of terms, flow of ideas, soundness of arguments, and relation of conclusions to evidence. Illustrative model questions are:

> How can ____ be improved? (our report, map, etc.; or, this graph, plan, etc.) Is it accurate? Well organized? Meaningful? Useful for our purpose?
> How accurate (or, adequate, useful, consistent, biased) is this _____? (document, diagram, flow chart, report, etc.)
> To what extent are the _____ supported? (conclusions, generalizations, inferences, etc.)

The second type of evaluation involves the use of external standards related to the objectives to be achieved and the means of achieving them. The standards may be the objectives, commonly used criteria, or comparison with a recognized standard of excellence. Examples of each type of standard are: (a) using objectives for urban renewal as criteria to assess plans, (b) using defined standards of freedom of speech to judge the conduct of a meeting, and (c) comparing a conservation program in one area with one recognized as being outstanding. Illustrative focusing questions are:

> To what extent will this _____ lead to the stated goals? (plan, program, type of action, etc.)
> To what extent were standards of _____ upheld during this period? (justice, freedom, personal security, etc.)
> How does this _____ compare with the model of an outstanding one? (report, anti-polution proposal, airport, political system, etc.)

Teaching Strategy

The strategy presented in Chart 89 begins with identifying and defining what is to be appraised, immediately followed by attention to the standards or criteria that should be used. In actual practice these phases may be joined together, provided students understand the focus of the evaluation. Next, attention is given to the gathering and interpreting of evidence to show the extent to which the defined standards are met. The next step is necessary if alternatives (different plans, materials, or proposals) are being assessed. If so, direct attention should be given to a consideration of possible outcomes, side effects, or consequences of each alternative with an attempt to identify the one that will have the most desirable uses or effects in light of the standards. Finally, a judgment or evaluation should be made of the quality or merit of the item(s) under appraisal with suggestions for improvement as appropriate.

At times special attention may need to be given to the intended use or purpose of the object or process being evaluated. For example, the purpose for using a table, graph, document, study trip or other resource needs to be clear in order to assess its contribution to inquiry. If students have unintended purposes in mind such as finding points to back up one's opinions when theintended purpose is to find points related to a question or hypothesis, the evaluation of the worth of the resource will certainly be altered. Ordinarily, the purpose or use of an item will be clarified as a part of group planning. If not, attention should be given to the use or purpose so that agreement can be reached on the focus of evaluation, or two or more foci may be used if it is appropriate to do so. The point here is to clarify understanding and communication, not to discourage divergence when it is an important part of inquiry.

A STRATEGY FOR EVALUATING

Procedure	Focusing Questions	Illustrative Application
Identify and define the focus of evaluation.	What is to be appraised? Why should it be assessed?	Why should we evaluate the renewal plans? How can we judge them?
Identify and define standards of appraisal.	What standards (values, objectives, criteria) should be used?	What are the goals for urban renewal? Are they OK for standards? What other ones might be used?
Collect data related to each standard.	What is the evidence? What data can we find for each standard?	What evidence do we have to show how the objectives will be achieved?
Identify possible outcomes (effects, consequences) of each proposal.	What are likely outcomes of each proposal? Which one will have the most desirable outcomes?	What may the effects of each proposal be on: Traffic? Business? Beautification? Other Objectives?
Make a judgment, including suggestions for improvement.	Which one best meets the standards? How might it be improved?	In general, which proposal is best? Why? In what ways can it be improved?

Chart 89

IV

UTILIZATION OF THE PROPOSED PROCESSES

Three uses of the proposed processes are discussed in this section. The first is related to the stating of objectives and evaluation. The second is the incorporation of the processes in lesson planning. The third is utilization of the processes in analyzing and evaluating instructional materials. The last section deals with problems in using the processes.

Objectives and Evaluation

Examples of objectives that may be used in evaluating outcomes of instruction are presented in this section. Objectives must be stated in performance (behavioral) terms if quantitative evidence of change is to be obtained and reported. General guidelines for writing performance objectives should be followed (Burns, 1971; Mager, 1962; Michaelis, 1972).

The sample objectives presented below illustrate how evaluation can be made of a student's ability to use each inquiry process. Each example is preceded by a brief definition of the inquiry process and a few sample questions that are illustrative of those teachers may use in classroom instruction. The writer has found that the inclusions of the definition and questions is helpful to teachers and curriculum planners in the preparation of evaluation materials. This is so because evaluation must be seen in the context of instruction and must be directly related to the various dimensions of each process.

Recalling (selective retrieval) of data, concepts, and main ideas related to topics under study by stating them verbally, recognizing appropriate items in materials, helping to phrase questions, discussing what we know and need to find out, and expressing interests and feelings. What do we know about _____? What does the phrase civil rights make you think of?

Given a list of four community workers, the student will be able to state the service each one provides, as presented in the text.

Observing (directly and indirectly) role, rules being used, decision making, division of labor in materials and in the community, as interviews and study trips are undertaken, and art objects, inscriptions and other items are examined. What did you see? Hear? Find? Read? Note?

Given a picture of houses in Switzerland's Alps, the student will be able to state at least three raw materials that are used to make them.

Defining major landforms, resources, goods, services, judge, and civil rights by giving an example, giving an analogy (it's like a _____), telling

what a judge does, and using the dictionary or glossary. What is this called? What does this mean? Can you define it in your own words?

Given the word "judge", the student will be able to define it by stating at least four things a judge does in court.

Interpreting roles, rules, population growth, changes, feelings, and values shown in various materials (pictures, maps, graphs, books) through discussion, role playing, choral reading, construction (table, graph, map), and art work. What does this show? What does it mean to you? How did it make you feel?

Given the diagram on steel production presented in the text, the student will be able to state in his own words the four steps that are shown.

Comparing/contrasting family and school life, climates, uses of resources, tools and technology, values, points of view, and culture as presented in pictures, maps, charts and other materials, role-playing, debates, panels, T.V. and radio programs, and resource visitors. How are they alike? How are they different? How are they similar?

Given two pictures showing houses in different climates, the student will be able to state at least two similarities and two differences.

Classifying resources, goods, roles, groups, processes of government, and environmental problems by discussing similarities and differences, selecting or sorting pictures or objects, making a chart, telling which go together, arranging an outline, mapping, and building word lists. Which ones go together? In which group should this be placed? Why should it be in this group?

Given a list of six goods and six services, the student will be able to list each one under the correct headings GOODS and SERVICES.

Generalizing in terms of data and related concepts through such activities as individual and group reports, stating a conclusion, making a map, time-line or other device that highlights a main idea, panels and round-table discussions, simulations (city council, legislature, U.N.), and written reports organized around main ideas. What is the main idea? What can we conclude? Can it be stated in one sentence?

After reading the selection on pp. __, the student will be able to state in his own words the main idea and support it by stating at least three related facts.

Inferring why it happened, next steps, possible causes, feelings, values, and position on an issue as a result of interviews, discussion, reading and listening "between the lines," telling how someone might feel, demonstrating what a policeman might do if _____, and telling what might be produced because of available resources. What is implied? What follows from that? So what?

After seeing the filmstrip on production of coffee, the student will be able to state how children working on coffee plantations might feel about their work, giving at least one reason for their statement.

Predicting what might happen next, population growth, change in production, election outcomes, and possible responses of individuals and groups to events and problems in terms of data from interviews, polls, tables, graphs, charts, diagrams, models, exhibits, study trips, and written materials. What will happen next? How big will our community be in 1980? Who will win this election? What might China's reaction be?

After examining a table which shows population growth of a state, the student will be able to predict what the population will be in 2000, giving at least two reasons for his prediction.

Hypothesizing causes, explanations, relationships, main ideas, or principles related to family and community activities, effects of weather and climate, why certain events occurred, what might be produced, where a city might be located, and the probability of an event occurring followed by testing hypotheses by experimenting, gathering evidence from materials, interviewing, direct observation, mapping or graphing relationships, using a model (erosion, competition, supply and demand), and comparing objects. Given these resources, what might they produce? If interest rates are increased, what will happen to housing construction?

After reading the sections on how communities in three different places trade with others, the student will be able to state why all communities in industrialized countries trade with others, and suggest at least one way in which his statement might be checked.

Analyzing family, school and community activities, change over time, cause and effect, multiple causation, multi-roles of an individual, modes of control (dependency, sanctions, rewards, norms, laws, force), and methods of getting change in group discussion, interviews, picture essays, historical and other maps, graphs, tables, timelines, objects, exhibits, and museums. What are the main parts? Causes? Reasons? Problems? Needs? Fallacies in this argument?

After examining the time line on Changes in Our State, the student will be able to break it down into four periods by listing at least three events under headings such as First Period, Second Period, Third Period, Fourth Period.

Synthesizing data and key ideas around such concepts as culture, family or other social institutions, groups, system, community, individual, and values by means of oral and written reports, exhibits, programs, maps, group-composed materials, scrapbooks, and social studies fairs. How shall we organize our reports? Program? Exhibit? How can we show how these events fit together?

Given

Given a list of 15 events in the history of Latin America, the student will be able to construct a time line that shows the fifteen events in sequence with correct scale between events.

Evaluating behavior, change, products, activities, events, proposals, and decisions through individual and group oral and written activities, role-playing, debates, panels, use of checklists, and self-evaluation, and group evaluation. In what ways is it good? Effective? Fair? Unjust? Right? Who will be helped? Hurt? Which is best for all?

Given the two readings on "Being a slave," the student will be able to list at least three reasons why he believes one reading is more accurate than the other.

Of utmost importance is informal ongoing evaluation of the development of each inquiry process. Such appraisal may be guided by the development of charts based on the skills and teaching strategies presented in Chapter III. The following examples are illustrative.*

ANALYZING	SYNTHESIZING
Have you identified the main parts?	Did you bring together the most important parts?
Can you describe each part? Tell why it is important?	Can you state the organizing idea that was used?
Can you state how the parts are related?	In what ways is it a new or original presentation of ideas?
How does analysis of the parts lead to better understanding?	In what ways might the form of presentation be improved?

Incorporating the Processes in Lesson Planning

The sample lesson plan that follows is illustrative of how the processes may be made a part of lesson plans along with related data, concepts, and generalizations. The first step in planning is to identify major understandings and related performance objectives. This is followed by projecting an instructional sequence, beginning with an introduction and followed by development and conclusion. As the instructional sequence is planned the inquiry processes to be emphasized are identified and written in the left hand column. Related data, concepts, and generalizations are noted in the right hand column.

*For additional examples, see:
John U. Michaelis. Social Studies for Children in a D mocracy. Fifth Ed., Englewood Cliffs, N.J.: Prentice-Hall, 1972.

WHERE IS OUR COUNTRY?

Major Understandings

Location of the United States. We live on a certain part of the earth. The name of our part of the earth is the United States.

Objectives

The children should develop the ability to.

Recognize the name "United States of America," and state that it is the name of our country.

Point to the location of the United States, including Alaska, Hawaii and Puerto Rico, on pictures of the earth and on the classroom globe.

State the colors used to show land and water in textbook pictures and on the classroom globe.

Teaching Strategy

Inquiry Processes	Questions and Activities	Data, Concepts Generalizations
	Introduction:	
Observing	Look at the large picture on the bottom of page 5. What does this picture show?	
Interpreting	What does the blue color show? What colors show land? Point to a part that shows water; that shows land.	COLOR SYMBOLS: Blue is used for water, various naturalistic colors for land. ...
	Development:	
Observing	Something special is marked on this drawing of the earth. What is it?	LINE SYMBOLS: Lines are used on globes to show the borders between countries.
Interpreting	Point to the two white lines that go across part of the land. What is shown between the two white lines? What is the name of our country? Point to this part of our country.	BOUNDRY LINES: The area between the white lines is the largest part of the United States.
Observing, Interpreting	Look at the part that shows an ocean. What do you see there that shows another part of our country? What is that part called?	LINE SYMBOL: Arrows are used to point out specific small areas. The state of Hawaii is shown in the Pacific Ocean.
	Conclusion:	
Synthesizing	Our country, the United States is shown in different places. Who can point to all of them to show us our whole country?	LOCATION: States and communities in the United States can be located on the globe.
Classifying	Which part of our country is the largest? Which part has water all around it? Which part is closer to the North Pole? Which parts are away from the largest part of our country?	PARTS OF THE UNITED STATES: Hawaii is surrounded by water, Alaska is to the north. Both are away from the largest part.

This model can be generalized to other topics, processes, and concepts. A guiding principle is to identify processes and concepts that are relevant in each phase of the teaching strategy.

Analyzing/Evaluating Instructional Materials

Material presented in the dissertation of one of the investigator's doctoral students is drawn upon to illustrate how the processes may be used to analyze and evaluate instructional materials (Traugh, 1972). Traugh's purpose was to analyze the questioning strategies in recently developed history textbooks that were based on a historical method of inquiry. The first step taken by Traugh was to develop a model of historical inquiry in which the proposed inquiry processes were related to each major phase of historical inquiry. As pointed out by Traugh the model should not be viewed as "a non-varying construct" and the listing of processes under each phase is not rigid. The model is quite useful in illustrating how different processes may be put to use.

Historigraphical Model

Problem Situation

Definition of Topic

a. recall
b. observe
c. define
d. classify
e. interpret
f. compare and contrast
g. analyze

Tentative Hypothesis or Explanation

a. hypothesize
b. synthesize

Reasoning

a. infer
b. generalize
c. predict
d. analyze

Data Gathering and Evaluation

a. observe
b. define
c. classify
d. analyze
e. interpret
f. compare and contrast
g. evaluate

Probable Explanation

a. hypothesize
b. synthesize

The next step taken by Traugh was the actual analysis of questions in the history materials. Content analysis procedures were used to determine (a) the number of questions related to each process and (b) the sequence in which the questions were arranged. It was found that the most frequently used processes were observing, analyzing, hypothesizing, and evaluating. The sequence of questions did not follow the model used in the study. Rather, the questioning strategies were either one step of the model or an incomplete combination of several steps.

Problems in Using the Proposed Processes

The writer has experienced several problems in using the proposed set of processes in the preparation of instructional materials. Observing and interpreting are easily confused because interpreting so frequently is made a part of the process of observing in the actual planning of instruction. For example, as students are asked to examine a picture or table (observing) they may also be requested to tell what it means to them (interpreting). If the picture or table presents data familiar to students there probably will be no serious problem in so far as learning is concerned. However, if accurate observation is essential and certain facts must be clarified prior to interpretation then the two processes should be kept separate for instructional purposes.

A difficulty that may arise in making plans to develop observing and interpreting skills stems from the fact that some skills subsumed under them may be overlooked. Both are quantitative skills that are needed to extend and refine observation. And both have been singled out in a science project (AAAS). The first is the use of measuring skills, ranging from simple linear measure to measures of volume. The second is the use of number skills.

Minor difficulties have arisen in distinguishing between interpreting and analyzing. For example, preliminary responses to a reading selection or map are typically interpretations and should be so labelled because of the importance of having students express the meaning they have derived. This is so even though the material deals with various elements and relationships among them. However, analysis may be desired at certain points in the instructional process as students are asked to explain in depth and to support with sound reasons their statements about the various parts of the whole, how the parts are related, and principles involved in the organization of the parts. The Taxonomy is quite helpful in this regard.

Another problem is that of making distinctions among inferring, hypothesizing, and predicting. One commonly finds in professional literature such expressions as "testing the inference" and "checking the

prediction" when the intention is to "confirm the hypothesis," following the definitions used in the proposed set of processes. The writer has found that the best way to meet this difficulty is to stick closely to the definitions proposed in this study and to provide practice in preparing questions and activities that clearly distinguish these three processes.

A difficulty that arises with individuals who have used the Taxonomy of Educational Objectives is that of placing the processes in a rigid hierarchy. This follows from the rationale on which the Taxonomy is based, namely, that each level of cognition depends on successful completion of the preceding level(s). To a limited degree this is true of the proposed set of processes. For example, one should never expect students to interpret or generalize in a given situation if they cannot recall appropriate data or have not made the necessary observations. And appropriate experiences in comparing, classifying, and defining are certainly needed before analyzing can be used effectively. But in planning instructional episodes one does not always begin with recalling and observing and move through the processes in a hierarchy. For example, hypothesizing may be used early in an instructional sequence to give direction to data collection. And evaluation may be used from the very beginning to assess how well "we are observing" or "how well we are classifying" or how well another process is being used. The point needing emphasis is that the instructional planner should suggest the process that is needed at a given point, being sure that students have made the learning that is prerequisite to its use.

In working with teachers and supervisors the writer has found that disagreements may arise as to the process or processes that students may be using at a given time. For example, a question such as "What is happening in this picture?" may evoke fairly simple interpretations on the part of some students and rather involved analyses on the part of a few who break the picture down into parts and discuss relationships among the parts. Given the wide range of individual differences in any class, such variations are to be expected. What the instructional planner should do is to suggest the process that should be emphasized, not the full range of processes that students themselves might employ. The latter course leads one to engage in a kind of mind reading that is bound to lead to disagreement. On the other hand, if emphasis is given to the process that should be utilized at a given point in instruction, the teacher should be able to move through the instructional sequence effectively, carry out related evaluation, and follow up with activities to meet individual differences.

V

SUMMARY AND NEEDED STUDIES

Summary

Selected professional materials for teachers and manuals accompanying textbooks for students were examined and recommended inquiry processes were identified. The more than 30 processes identified in the selected materials were subsumed in a proposed set of 13 processes as follows:

Recalling: remembering, recognizing (an item already learned)
Observing: seeking evidence, collecting data, identifying, describing measuring and recording (as extensions of observing)
Comparing/contrasting: differentiating
Classifying: organizing data, coding, recording, sequencing
Defining: making analogies (one means of defining)
Interpreting: relating, translating, explaining, summarizing
Generalizing: making of analogies, supporting statements with evidence
Inferring: stating assumptions, making analogies
Predicting: extrapolating (one means of predicting)
Hypothesizing: explaining (as a part of hypothesis formulation), controlling of variables (as part of hypothesis testing)
Analyzing: looking for assumptions, seeing causal relationships, coding
Synthesizing: integrating, making models, designing projects, theorizing
Evaluating: criticizing, value seeking, decision making

Global skills or processes such as communicating, applying, using numbers, and using space/time relationships should be used as needed with all of the above processes, as appropriate. Skills such as explaining and summarizing also should be used as needed with various processes.

A definition, specific skills, focusing questions, and a teaching strategy were identified for each of the proposed processes. Ways in which the processes may be used and problems in using them were also suggested. Needed studies are identified in the following section.

Needed Studies

Several studies are needed to identify uses of the proposed set of inquiry processes. Of primary importance is an analysis to determine the extent to which the processes are used in other areas of the curriculum. Other studies, similar to Traugh's, are needed to determine the extent to which processes are included in models of inquiry and in instructional materials in economics, political science, anthropology, geography, sociology, and interdisciplinary studies designed for use in secondary schools.

A comparative analysis is needed of various models of inquiry proposed for use in the social studies to determine the extent to which they include basic processes of inquiry. Related to such a study whould be an analysis of suggestions to teachers regarding the development of inquiry processes as models of inquiry are used.

A variety of empirical studies might be undertaken to evaluate the extent to which various treatments contribute to the development of inquiry processes. Relationships among treatments, attainments, and such variables as socio-economic level, achievement, and academic potential should be explored.

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